RECENT PUBLICATIONS OF THE
FOREST PRODUCTS LABORATORY
JANUARY 1 TO JUNE 30, 1970
FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE

DIVIDENDS FROM WOOD RESEARCH

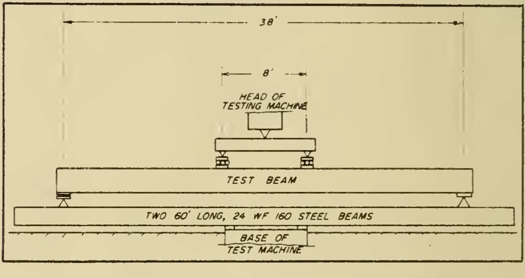
Properties of Imported Tropical Woods

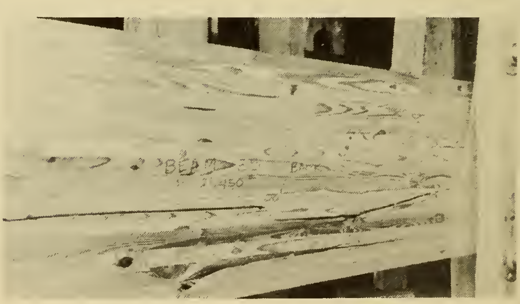
1. Properties of Imported Tropical Woods, by B. F. Kukachka. U.S. Forest Service Research Paper FPL 125, 67 pp. Mar. 1970.

If you need a tropical wood and want to know more about it, chances are you'll find useful information in this report. It describes more than 100 genera, each including a number of species, that grow in southeast Asia, Africa, and Latin America.

You'll find the report a handy compendium of woods ranging from the familiar Central American mahogany (Swietenia genus) and the lauans, or "Philippine mahogany," to relatively unfamiliar woods like Amazonian purpleheart (genus Peltygyne), kokradua (genus Pericopsis) from Africa's Ivory Coast, Indonesian ramin (genus Gonystylus), a whitish or straw-colored wood, and golden-brown mayflower, a Mexican wood of the genus Tabebuia superficially resembling oak, and also known as apamate.

Kukachka, an authority on Latin American woods, has included information from many sources, notably the British Forest Products Research Laboratory and the Yale Graduate School of Forestry. Both institutions have done much work on tropical woods. Highly useful information is tabulated on strength, shrinkage, and recommended dry kiln schedules for many of the woods described.


38'
8'
HEAD OF
TESTING MACHINE
TEST BEAM
TWO 60' LONG, 24 WF 160 STEEL BEAMS
BASE OF
TEST MACHINE



Flexural Properties of Glued-Laminated Southern Pine Beams with Laminations Postioned by Visual-Stiffness Criteria

2. **Flexural Properties of Glued-Laminated Southern Pine Beams with Laminations Positioned by Visual-Stiffness Criteria, by R. C. Moody and Billy Bohannan. U.S. Forest Service Research Paper FPL 127, 20 pp. Feb. 1970.**

Stiffer, stronger glued laminated beams can be made if visually graded lumber is first tested for modulus of elasticity and the stiffer pieces are used in the outer laminations.

Experiments with 40-foot laminated beams 24-3/8 inches deep and 5-1/4 inches wide demonstrated the practicability of this method of fabricating the huge beams used to span large areas in schools, supermarkets, churches, sports arenas, and other big buildings. The experimental beams averaged 12 percent stiffer and 14 percent stronger than beams in which the laminations were positioned by visual criteria only.

The experiments centered on the effect of placing the stiffest material in the socalled tension lamination--the bottom laminations in a beam loaded as in a floor or roof. Earlier experiments had shown that these laminations are usually the first to fail under this standard bending load.

The results suggest that beams can be designed to make more efficient use of lumber if the individual pieces are first given a nondestructive test for modulus of elasticity as well as conventional visual grading. Less lumber would be needed for the smaller beams designed for specific loading conditions.

ITEMS FOR FREE DISTRIBUTION are numbered, and available from the Forest Products Laboratory while the supply lasts. To request publications simply circle the appropriate number on the back cover of this list, detach, and mail to the Laboratory. Blanket requests for publications cannot be filled.

Reports of slight interest to the layman are designated "Highly technical."

Other recent FPL publications

DRYING

3. Air Drying Lumber in a Forklift Yard, by Raymond C. Rietz. USDA Forest Service Research Note FPL-0209, 16 pp., Apr. 1970.

   Yarding of stickered unit packages of lumber by the forklift truck has resulted in major changes in the layout and operation of air-drying yards. This report describes practices that reduce drying time and drying degrade.

FINISHES

4. Wood Finishing: Blistering, Peeling, and Cracking of House Paints from Moisture, by Forest Products Laboratory. USDA Forest Service Research Note FPL-0125, 7 pp., May 1970.

   These characteristics are used to diagnose the cause of any paint failure, the source of moisture, and correct procedures to follow to prevent future problems.

GLUES AND GLUED PRODUCTS

5. Buckle in Veneer, by J. F. Lutz. USDA Forest Service Research Note FPL-0207, 12 pp., Feb. 1970.

Buckle is caused by unequal stresses across or parallel to the grain of a sheet of veneer. The most important veneer buckle is evident as overall distortion of the sheet. Adding moisture to the veneer and then pressing it between flat hot plates is the most practical way to minimize buckle.

6. Cure Rate of Resorcinol and Phenol-Resorcinol Adhesives in Joints of Ammonium Salt-Treated Southern Pine, by R. E. Schaeffer. USDA Forest Service Research Paper FPL 121, 12 pp., Jan. 1970.

A resorcinol resin adhesive of commercial manufacture, formulated for the purpose of gluing ammonium salt-treated wood, gave excellent performance in shear strength and wood failure in joints of southern pine. Six ordinary phenol-resorcinol or resorcinol adhesives did not meet the commercial standard minimum requirements for gluing fire-retardant-treated wood.

7. Gap-Filling Adhesives in Finger Joints, by R. E. Schaeffer. USDA Forest Service Research Paper FPL 140, 7 pp., Apr. 1970.

By pretreating and heating mating surfaces or using hot adhesives in untreated surfaces, Douglas-fir and southern pine finger joints were made comparable in strength to commercial finger joints, even though the fingers were warped and loose fitting.

8. Improving End-to-End Grain Butt Joint Gluing of White Pine, by R. E. Schaeffer and R. H. Gillespie. Forest Products Journal 20(6):39-42, June 1970.

Tensile strength approaching that of clear eastern white pine was achieved in butt joints with epoxy resins by pretreating and heating the joint surfaces before gluing. Three chemical accelerators performed well in the pretreatment. Joints made with 15- and 30-mil gluelines had higher tensile strengths than those 5 mils thick.

9. Tensile Stress-Strain Behavior of Flexibilized Epoxy Adhesive Films, by W. T. Simpson and V. R. Soper. USDA Forest Service Research Paper FPL 126, 13 pp., Mar. 1970.

Determination of tensile stress-strain behavior and mechanical properties for films of flexibilized epoxy adhesives demonstrates that the mechanical properties of the adhesives can be manipulated. (Highly technical)

MECHANICAL PROPERTIES

10. Dependence of MOE on Strength Ratio and Specific Gravity: 4-Inch-Thick Southern Pine, by C. C. Gerhards. Forest Products Journal 20(6):37-38, June 1970.

Evidence is presented that modulus of elasticity is grade-dependent. Linear functions of strength ratio and specific gravity accounted for about 67 percent of the variation in modulus of elasticity of beams.

11. Design Stresses for Hardboard--Effect of Rate, Duration, and Repeated Loading, by J. Dobbin McNatt. Forest Products Journal 20(1):53-60, Jan. 1970.

Hardboard under different loading conditions behaved similar to solid wood. At different loading rates, strength decreased 8 percent for each tenfold increase in time to failure. Under constant stress, a decrease of 8 percent in stress level increased time to failure tenfold. Fatigue strength for 10 million stress cycles was 45 percent of static strength.

12. Mechanical Properties and Specific Gravity of a Randomly Selected Sample of Engelmann Spruce, by B. A. Bendtsen and H. E. Wahlgren. USDA Forest Service Research Paper FPL 128, 13 pp., Jan. 1970.

Lists average values for randomly sampled Engelmann spruce (Picea engelmannii Parry). Results proved slightly higher than currently accepted U.S. values for the species.

13. Further Report on Seasoning Factors for Modulus of Elasticity and Modulus of Rupture, by Charles C. Gerhards. Forest Products Journal 20(5):40-41, May 1970.

Seasoning factors are given for modulus of elasticity and modulus of rupture based on tests of 64 pairs of 4- by 8-inch beams. The seasoning factor for modulus of rupture was dependent on quality as measured by strength ratio, but the seasoning factor for modulus of elasticity did not depend on quality.

14. Tensile Strength of Finger Joints in Pith-Associated and Non-Pith Associated Southern Pine 2 by 6's, by R. C. Moody. USDA Forest Service Research Paper FPL 138, 20 pp., Apr. 1970.

Finger-jointed lumber free of pith-associated material was significantly stronger in tension than wood containing pith.

15. Fatigue Fundamentals for Composite Materials, by Kenneth H. Boller. Reprinted from American Society for Testing Materials, STP 460, pp. 217-235, 1969.

Fatigue characteristics of composite materials involve a basic knowledge of the materials either mixed or woven together to form anisotropic laminates. The anisotropy of the composite causes more complicated fatigue characteristics than those experienced in metals, some advantageous and some disadvantageous, so that design criteria need to be carefully established.

16. Tables for Developing Nonparametric Estimates of Near-Minimum Property Values, by B. A. Bendtsen and Fred Rattner. USDA Forest Service Research Paper FPL 134, 13 pp., Apr. 1970.

Presents tables which relate confidence coefficients, one-sided tolerance limits, and sample size for the first through fifth order statistics. (Highly technical)

PACKAGING

17. Cushioning Performance of Multilayer Corrugated

Fiberboard Pads Loaded at Center Only, by C. A. Jordan. USDA Forest Service Research Paper FPL 136, 12 pp., June 1970.

Describes a method for deriving optimum cushioning design data for two- through four-layer C-flute pads in terms of number of pad layers and diameter of central circular loading area. Optimum design criteria are given for the material studied, and for five-layer pads studied previously.

18. Effect of Atmospheric Moisture Content upon Shock Cushioning Properties of Corrugated Fiberboard Pads, by R. K. Stern. USDA Forest Service Research Paper FPL 129, 14 pp., May 1970.

Shock absorption capabilities of five- and ten-layer corrugated fiberboard pads exposed to various atmospheric moisture contents are determined. Because these represented the range of pad thicknesses commonly used by industry, the variation in shock cushioning ability was defined under these conditions.

PERFORMANCE OF WOOD IN FIRE

19. Determining the Utility of a New Optical Test Procedure for Measuring Smoke from Various Wood Products, by J. J. Brenden. USDA Forest Service Research Paper FPL 137, 20 pp., June 1970.

A new procedure for measuring smoke is described, its advantages are discussed, and smoke determinations are included for samples of different wood species and panel products.

20. Thermal Degradation of Wood Components: A Review of the Literature, by F. C. Beall and H. W. Eickner. USDA Forest Service Research Paper FPL 130, 26 pp., May 1970.

Presents a discussion of the general thermal degradation processes for wood followed by a review of literature relating to the thermogravimetric and differential thermal analysis of

the thermal degradation of wood, cellulose, hemicelluloses, and lignin. (Highly technical)

PRESERVATION

21. Treated Wood Foundations for Buildings, by L. R. Gjovik and R. H. Baechler. Forest Products Journal 20(5):45-48, May 1970.

Interest in wood foundations for buildings other than pole types has created the need for a high-quality preservative treatment. This paper points out the greater durability of round than sawn material and discusses size and shape of member in relation to type and quantity of preservative. Current specifications are discussed.

22. Vacuum Treatment of Lumber, by J. O. Blew, E. Panek, and H. G. Roth. Forest Products Journal 20(2):40-47, Feb. 1970.

Penetrations and retentions of pentachlorophenol-petroleum and of acid copper chromate were compared on lumber of six species treated by the long-cycle vacuum process and by pressure impregnation. Most correlations between retention by assay and weight were weak. Penetrations in vacuum treatments were less than in pressure treatments.

23. Marine Tests on Combination-Treated Round and Sawed Specimens, by R. H. Baechler, L. R. Gjovik, and H. G. Roth. American Wood-Preservers' Association Proc., 8 pp., 1970.

Of specimens treated in several ways and exposed in six harbors, the most effective deterrent to marine borers was pressure creosoting preceded by copper-arsenic solutions. The double-diffusion procedure for the first stage appeared promising. Leaching from small panels was much faster than from larger round specimens.

24. Effectiveness and Permanence of Several Preservatives in Wood Coupons Exposed to Sea Water, by R. H. Baechler, Beatrice R. Richards, A. P. Richards, and H. G. Roth. American Wood-Preservers' Association Proc., 16 pp., 1970.

Pine coupons treated with different preservatives were exposed in two harbors and removed biannually for observation of biological attack and for chemical analyses. Losses of preservatives tended to level off after 6 months. No definite relation was found between amount or character of residual preservatives and onset of borer attack.

25. Quantitative Differences in Preservative Penetration and Retention in Summerwood and Springwood of Longleaf Pine, by L. R. Gjovik, H. G. Roth, and L. F. Lorenz. American Wood-Preservers' Association Proc., 3 pp., 1970.

Springwood of longleaf pine accepts creosote treatment less readily than summerwood. Consequently, summerwood generally contains more creosote than springwood on a per-unit volume basis at the lower total sapwood retentions. Beyond about 16 pounds per cubic foot, the springwood retention exceeds the summerwood retention. (Highly technical)

PHYSICAL PROPERTIES

26. Bacterial Attack in Water-Stored Bolts, by T. L. Highley and J. F. Lutz. Forest Products Journal 20(4):43-44, Apr. 1970.

Bacteria initially present in pine and yellow-poplar bolts continued to develop when the bolts were stored in water containing 0.5 percent sodium pentachlorophenate; however, bacteria failed to spread to noninfected bolts stored in the same solution.

27. Directional Permeability of Softwoods, by G. L. Comstock. Wood and Fiber 1(4):283-289, 1970.

Two hypothetical models of wood structure were analyzed to determine their usefulness in explaining the difference between longitudinal and tangential permeability. The closest approximation to published data assumed that wood cells have tapered ends that overlap on the radial surfaces and that contain pits only on these tapered ends. (Highly technical)

28. Effect of <u>Trichoderma Viride</u> and a Contaminating Bacterium on Microstructure and Permeability of Loblolly Pine and Douglas-Fir, by Bruce R. Johnson

and Lee R. Gjovik. American Wood-Preservers' Association Proc., 7 pp., 1970.

Trichoderma mold destroyed ray parenchyma cells and pinoid pit membranes of loblolly pine. Rays were not degraded in Douglas-fir sapwood or heartwood. Bordered pits and longitudinal permeabilities of all specimens were slightly affected by the hyphae. In some specimens, bacteria greatly increased permeability by destroying bordered-pit membranes. (Highly technical)

SANDWICH

29. Buckling Coefficients for Simply Supported, Flat, Rectangular Sandwich Panels under Biaxial Compression, by Edward W. Kuenzi. USDA Forest Service Research Paper FPL 135, 18 pp., Apr. 1970.

Presents the derivation of formulas for the buckling coefficients of simply supported, flat, rectangular sandwich panels under edgewise (in-plane) biaxial compression loads. (Highly technical)

STORAGE OF CHIPS

30. Spontaneous Heating in Piled Wood Chips. I. Initial Mechanism, by E. L. Springer and G. J. Hajny. Tappi 53(1): 85-86, Jan. 1970.

Data on oxygen consumption and carbon dioxide evolution of fresh, green aspen and Douglas-fir chips free of microorganisms, combined with similar data on sterilized chips, indicate that the initial heat release of these chips is caused by respiration of their living ray parenchyma cells. (Highly technical)

31. A Simulator of an Outside Chip Pile, by E. L. Springer and L. L. Zoch. Tappi 53(1): 116-117, Jan. 1970.

A tower-type chip pile simulator was designed and con-

structed. On filling the simulator with fresh aspen chips, its center temperature profile responded in the same manner as the temperature profiles observed in outside chip piles. (Highly technical)

STRUCTURE AND GROWTH CONDITIONS

32. Computer Predicts Maple Yields to Within 1-1/2 Percent, by Daniel Dunmire and George Englerth. Furniture Design & Manufacturing 42(1):30, 32, Jan. 1970.

Dimension part yields from a representative sample of hard maple are presented. The actual yields obtained at a commercial dimension lumber mill were within 1-1/2 percent of the FPL predictions. (The FPL predictions were based on results from Research Papers FPL 81, 85, or 118)

33. Improved Technique for Determining the Volume of Irregularly Shaped Wood Blocks, by J. Frank Heinrichs and L. E. Lassen. Forest Products Journal 20(4): 24, Apr. 1970.

Describes a procedure for obtaining the volume of irregularly shaped blocks during specific gravity determination. It enables one operator using one modified balance to weigh specimens in air and submerged in water. The balance modification is minor. The new procedure results in greater accuracy and output over the previous system.

34. Surface Soil Properties of Black Walnut Sites in Relationship to Wood Color, by R. R. Maeglin and N. D. Nelson. Soil Science Society of Amer. Proc. 34(1): 142-146, 1970.

Soils supporting black walnut trees (Juglans nigra L.) in Indiana and Missouri are shown to have physical and chemical properties that are associated with heartwood color. The heartwood color was quantitatively measured for luminance, dominant wavelength, and purity using a spectrophotometer. Available phosphorus, exchangeable potassium, calcium, magnesium, total nitrogen, and pH were found to be most important in relation to color variation. (Highly technical)

35. Development of a Model for Estimating Tree Specific Gravity of Loblolly Pine, by Harold E. Wahlgren and David O. Yandle. Wood Science 2(3): 129-135, Jan. 1970.

In wood density surveys the basic sampling unit, an increment core must be converted to an estimate of average tree specific gravity. Current practices involve empirical means where tree gravity is related to selected variables. This study involved precise model development using actual gravity trends within the tree. The developed model fitted the data better than previous empirical models. (Highly technical)

36. Locating the Initial in the Vascular Cambium of Pinus strobus L. by Electron Microscopy, by Lidija Murmanis. Wood Science & Technology, 4(1970), pp. 1-14.

Initial cell is located in the four cell group between immature xylem and phloem; its thicker tangential wall indicates the direction of its activity. Immature xylem cells are grouped in four, immature phloem cells in pairs. Extra-thick tangential wall in immature xylem shows the changeover from phloem to xylem production. (Highly technical)

WOOD CHEMISTRY

37. Alkali Requirements for Improving Digestibility of Hardwoods by Rumen Micro-Organisms, by W. C. Feist, A. J. Baker, and H. Tarkow. Journal Animal Science 30(5): 832-835, May 1970.

The alkali requirement is that for saponifying acetyl groups and other esters involving 4-0-methyl glucuronic acid. (Highly technical)

38. Enzymic Dehydrogenation of the Lignin Model Coniferaldehyde, by W. J. Connors, C.-L. Chen, and J. C. Pew. Journal of Organic Chemistry 35(6): 1920-1924, June 1970.

Since coniferaldehyde is involved in the biosynthesis of lignin and the grouping persists in the final product, this compound was subjected to enzymic dehydrogenation separately. Three dimers were isolated and identified. These are more highly colored than the starting compound and are probably

involved in the yellow color of lignin in wood. (Highly technical)

WOOD FIBER PRODUCTS

39. Measuring Shrinkage in Handsheets During Drying, by Gary C. Myers. USDA Forest Service Research Paper FPL 131, 14 pp., May 1970.

During drying, increase in shrinkage force and reduction in thickness and width of handsheets are measured simultaneously for seven different pulps and at several freenesses of one of the pulps.

40. Effect of Forming Conditions of the Wet Web on Mechanical Properties of Kraft Papers, by D. J. Fahey and C. W. Polley. USDA Forest Service Research Paper FPL 133, 13 pp., Mar. 1970.

Describes the effect of four forming variables producing strong kraft papers from furnishes of northern and of southern pine.

41. How Press Temperature Affects Linear Stability of Hardboard, by Paul E. Steinmetz. Wood and Wood Products 75(6):49, June 1970.

Dimensional stability of dry-formed hardboard was improved by increase in pressing temperature. This also permitted a shorter press cycle without affecting mechanical properties.

42. Value Recovery from Wood Fiber Refuse, by Wayne F. Carr. Proceedings of the Second Mineral Waste Utilization Symposium, Mar. 1970, pp. 263-269.

Compares wood fiber resource availability with anticipated needs, and relates increasing amounts of municipal refuse to paper consumption. Discusses where these nondesirable wood-fiber outputs from our system can be placed and possible sequences for the conversion from nondesirable to desirable raw material for continued use.

GENERAL

43. Wood in the Soaring 70's, by H. O. Fleischer. Woodworking & Furniture Digest 72(1): 36-39, Jan. 1970.

Describes advances in store for the woodworking, millwork, and furniture industries during the 70's--namely, faster processing, automation, and greater stress on quality.

U.S. DEPARTMENT OF AGRICULTURE
Forest Service
Forest Products Laboratory
Madison, Wisconsin 53705

Official Business

Place
Postage
Here

Information and Publication Services
U.S. Forest Products Laboratory
Madison, Wisconsin 53705
U.S.A.

PLEASE CIRCLE DESIRED PUBLICATION

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42	43	

IMPORTANT: To retain your name on our mailing list, card must be returned within 30 DAYS.

Please ☐Continue ☐Discontinue my name on list

70-1

FPL-1600-2

PLEASE PRINT NEW ADDRESS IF CHANGED

NAME ____________________

COMPANY ____________________

ADDRESS ____________________

CITY ____________________

STATE, ZIP CODE ____________________

Please refer to the identification number on your mailing label when corresponding about the mailing list or publications